An improved procedure for evaluating the annoyance of small arms ranges

George Luz

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suggested that the A-weighted level of noise, which is not the best speech interference measure for steady-state wideband noises, may be the best simple comprehensive measure of the speech interfering aspects of noise.

3:45

O5. Frequency weighting to assess sleep and classroom environments. Jerome S. Lukas (California Department of Health Services, Office of Noise Control, Berkeley, CA 94704)

Only a limited amount of specific data are available regarding the relative effectiveness of A- versus C-weightings in predicting the effects of noise on sleep or of noise on children in classrooms. These data will be reviewed, but suggest that with respect to sleep the results are equivocal. In the classroom, the single study available [Lukas, DuPree, and Swing, in press] suggests the C-weighted noise levels are more highly correlated (negatively) wth academic achievement that are A-weighted levels.

Contributed Papers

4:10

O6. A-weighting for assessment of highway noise impact. Charles E. Wilson (New Jersey Institute of Technology, 323 High Street, Newark, NJ 07102)

Exposure to transportation noise sometimes results in unacceptable noise levels inside residential and office buildings. Underprediction of intrusive noise can result from the frequency characteristics of building attenuation and from room effects when low-frequency tones are prominent at the source. The significance of A-weighting in relation to this problem is investigated through simultaneous measurements of indoor and outdoor noise.

4:25

O7. An improved procedure for evaluating the annoyance of small arms ranges. George Luz (US Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD 21010)

By combining annoyance data published in studies of small arms ranges in Sweden and Australia with other data on the acoustics and levels of small arms fire published in limited distribution Army and Navy technical reports, the author derives a computer program for predicting the impact and annoyance of small arms ranges firing ammunition up to 25 mm. Copyright free copies of the computer program written in BASIC will be available for interested participants.

TUESDAY AFTERNOON, 9 NOVEMBER 1982
DADE AND FLORIDA KEYS ROOMS, 2:00 TO 5:05 P.M.

Session P. Physical Acoustics III: Relaxation, Interactions, and Propagation

F. Douglas Shields, Chairman

Physics Department, University of Mississippi, University, Mississippi 38677

Chairman's Introduction—2:00

Contributed Papers

2:05

P1. Self-de-excitation of water vapor: Monomer and dimer contributions. Allan J. Zuckerwar (NASA Langley Research Center, M/S 238, Hampton, VA 23665)

Past efforts to interpret experimental data on the de-excitation rate of the $\nu_2(1\rightarrow 0)$ vibrational mode of water vapor have been thwarted because of the attempt to fit the data to a single relaxation time. In a phenomenological theory proposed here the de-excitation takes place by means of two parallel reactions: (1) the conventional collisional de-excitation of the monomer and (2) a two-step reaction involving association and re-dissociation of the dimer. The resulting relaxation equation yields two coupled relaxation times. In pure H_2O and in mixtures without O_2, the reaction rate for dimer association is taken to be very slow, and the relaxation modes are effectively decoupled: the first corresponding to de-excitation of the monomer and the second to spontaneous dissociation of the dimer. In mixtures of H_2O–air and H_2O–O_2, the association rate of the dimer is found to increase strongly, suggesting that O_2 serves as an effective "chaperon" for this reaction, and the relaxation modes of the monomer and dimer become strongly coupled. Fourteen sets of past data, representing a wide variety of test conditions and experimental methods, both acoustical and nonacoustical, are organized into three groups—each corresponding to a relaxation mode predicted by the theory.

2:20

P2. Relaxation mechanism for low-frequency sound absorption by boric acid in sea water. Robert H. Mellen (MAR, Incorporated, East Lyme, CT 06333)

Investigation of the low-frequency boric acid relaxation in sea water by the resonator method shows that the mechanisms is an exchange reaction with the carbonate system, i.e., $B(OH)_3 + CO_3^{-2} \rightleftarrows B(OH)_4^- + HCO_3^-$. However, the absorption is small unless calcium is present; then the system can be modeled as a complex exchange involving the ion pairs $CaCO_3^\circ$ and $CaB(OH)_4^+$. Theory and supporting experimental results are presented. [Work supported by DARPA.]